

Table-Lookup Methology with a Branch, for  $log_b(X)$ .

FIG. 1
(PRIOR ART)

# Argument Reduction: Get $B_j$ from set of breakpoints

Compute  $Z_{hi} + Z_{lo} \approx C(YB_j - 1)$ ,  $|Z_{hi} + Z_{lo}| \le delta$   $\frac{204}{204}$ 

#### Table Lookup:

Get T<sub>hi</sub>, T<sub>lo</sub> approx. log<sub>b</sub>(1/B<sub>j</sub>) Get L<sub>hi</sub>, L<sub>lo</sub> approx log<sub>b</sub>2 208

## Core Approximation:

Compute  $P \approx \log_b (1 + Z/C) - Z$ 212

#### Reconstruction:

Compute  $A_1 = kL_{hi} + T_{hi} + Z_{hi}$ Compute  $A_2 \approx kL_{lo} + T_{lo} + P$ Return  $\underbrace{A_1 + (A_2 + Z_{lo})}_{otherwise}$  or  $\underbrace{(A_1 + Z_{lo}) + A_2}_{kN + j = 0}$ 

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A Branch-Free Table-Lookup Methology for  $log_b(X)$ .

# FIG. 2

### Argument Reduction:

Get  $B_j$ , j=0,1,..., 32 from set of breakpoints Compute  $Z_{hi} \approx Y_{hi}$   $B_j - 1$ ,  $Z_{lo} = Y_{lo}$   $B_j$ ,  $|Z_{hi} + Z_{lo}| \le 2^{-6}$   $\frac{304}{}$ 

#### Table Lookup:

Get  $T_{hi}$ ,  $T_{lo}$  approx.  $log_b(1/B_j)$ Get  $L_{hi}$ ,  $L_{lo}$  approx  $log_e 2$ 308

#### Core Approximation:

Compute  $P \approx \log_e (1 + Z) - Z$ 312

#### Reconstruction:

Compute  $A_1 = kL_{hi} + T_{hi} + Z_{hi}$ Compute  $A_2 \approx kL_{lo} + T_{lo} + P$ Return  $A_1 + (A_2 + Z_{lo})$  or  $A_1 + A_2$ otherwise  $A_1 + A_2 + A_3$   $A_1 + A_2 + A_3$   $A_1 + A_3 + A_4$   $A_1 + A_2 + A_3$   $A_1 + A_2 + A_3$   $A_1 + A_2 + A_3$   $A_1 + A_3 + A_4$   $A_1 + A_2 + A_3$   $A_1 + A_4$   $A_2 + A_4$   $A_1 + A_4$   $A_1 + A_4$   $A_1 + A_4$   $A_2 + A_4$   $A_1 + A_4$   $A_2 + A_4$   $A_1 + A_4$   $A_1 + A_4$   $A_2 + A_4$   $A_1 + A_4$   $A_1 + A_4$   $A_2 + A_4$   $A_1 + A_4$   $A_1 + A_4$   $A_1 + A_4$   $A_2 + A_4$   $A_1 + A_4$   $A_1 + A_4$   $A_2 + A_4$   $A_3 + A_4$   $A_4 + A_4$  $A_4$ 

Branch-Free Table-Lookup  $\log_{e}(X)$ .

FIG. 3

**Argument Reduction:** 

Get  $D_j$ , j = 0,1, ..., 32 from set of breakpoints,  $D_j = CB_j$ , C = 28/64Compute  $Z_{hi} \approx Y_{hi}$   $D_j - C$ ,  $Z_{lo} = Y_{lo} D_j$ ,  $|Z_{hi} + Z_{lo}| \le 2^{-6}$ 

#### Table Lookup:

Get  $T_{hi}$ ,  $T_{lo}$  approx.  $log_b(1/B_j)$ Get  $L_{hi}$ ,  $L_{lo}$  approx  $log_{10}2$ 408

#### Core Approximation:

Compute  $P \approx \log_{10} (1 + Z/C) - Z$   $\frac{412}{}$ 

#### Reconstruction:

Compute  $A_1 = kL_{hi} + T_{hi} + Z_{hi}$ Compute  $A_2 \approx kL_{lo} + T_{lo} + P$ Return  $A_1 + (A_2 + Z_{lo})$  or  $A_1 + A_2$ otherwise  $A_1 + A_2 + A_3$  $A_1 + A_2 + A_3$ 

Branch-Free Table-Lookup  $log_{10}(x)$ .

FIG. 4

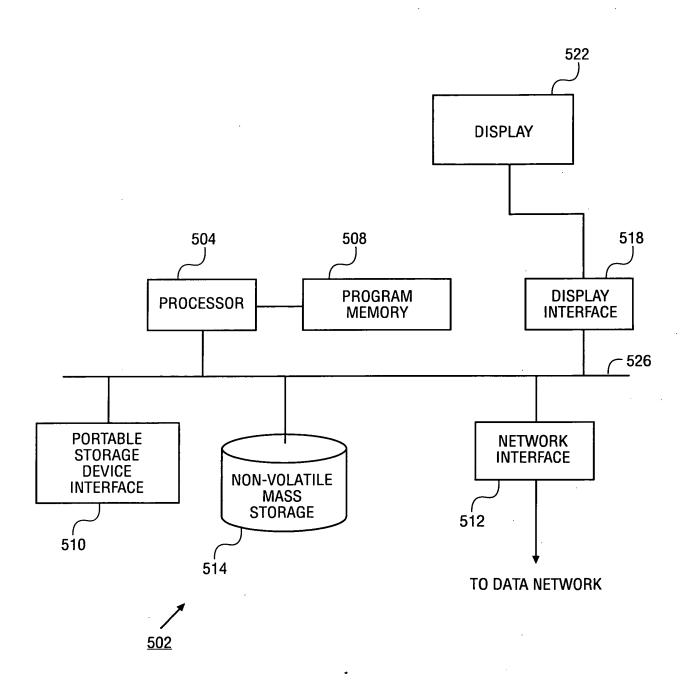


FIG. 5